EL CORONADO RANCH HABITAT CONSERVATION PLAN 2010
FISH MONITORING REPORT

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ACKNOWLEDGEMENTS

The completion of the 2010 El Coronado Ranch Habitat Conservation Plan fish monitoring could not have been accomplished without the cooperation and assistance from the following HCP partners and volunteers: Josiah and Valer Austin (El Coronado Ranch), Bill Radke and Chris Lohrengel (USFWS – San Bernardino National Wildlife Refuge), and Jason Kline and Don Mitchell (Arizona Game and Fish Department).

Yaqui chub © Bill Radke, USFWS

Yaqui catfish © Bill Radke, USFWS

longfin dace © Bill Radke, USFWS

Mexican stoneroller © Jeremy Voeltz, USFWS

INTRODUCTION

In 1998, El Coronado Ranch owners Josiah and Valer Austin entered into Arizona's first Habitat Conservation Plan (HCP), which allowed cattle ranch operations to continue while at the same time institutionalizing existing conservation measures for the federally endangered Yaqui chub *Gila purpurea*. The El Coronado Ranch HCP and Implementation Agreement (USFWS 1998) require that monitoring and reporting on the success of conservation measures occur annually for the first five years of the permit. Coleman (2002) provided a thorough review of the biogeography of Rio Yaqui fishes in Arizona and the HCP study area (Figure 1), along with recent management efforts and results of fish monitoring conducted in 2000 and 2001. In 2003, the Arizona Fish and Wildlife Conservation Office (previously Fishery Resources Office) assumed responsibility to coordinate HCP fish monitoring efforts with the San Bernardino National Wildlife Refuge and Arizona Game and Fish Department, and reports (Brouder 2003, 2004, 2006; Voeltz 2006; Johnson 2007; Voeltz 2009, 2010) summarizing these activities were provided to all interested parties. This report summarizes results of the 2010 El Coronado Ranch HCP fish monitoring effort that continued to follow procedures outlined in the finalized El Coronado Ranch HCP Monitoring Plan (Coleman and Minckley 2003). Appendix A provides a summary table comparing this year's results with past monitoring results (Brouder 2005, 2006; Voeltz 2006, Johnson 2007; Voeltz 2009, 2010).

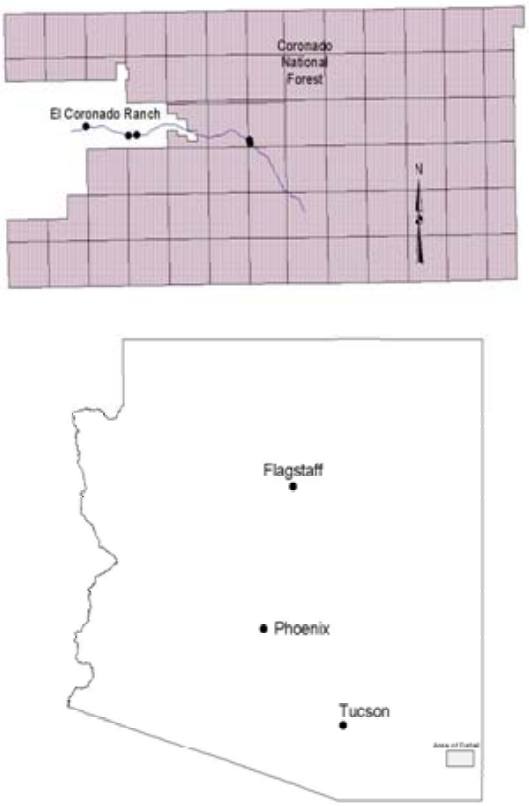

Figure 1. General location of El Coronado Ranch.

EL CORONADO RANCH PONDS SURVEY

Tennis Court Pond

Methods
Eleven minnow traps were fished overnight (1530-hr to 0730-hr) on October 4-5, 2010 in the Tennis Court Pond. A sub-set of 100 Yaqui chub *Gila purpurea* captured were measured for total length (mm; TL) and immediately released back into Tennis Court Pond. Catch per unit effort (CPUE) was calculated as the number of fish/total hours of netting.

Results
A total of 1023 Yaqui chub were collected in approximately 16 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 5.81 fish/hour. Mean total length of the sub-sample of Yaqui chub measured was 67.2 mm and ranged in size from 39 to 90 mm (Figure 2).

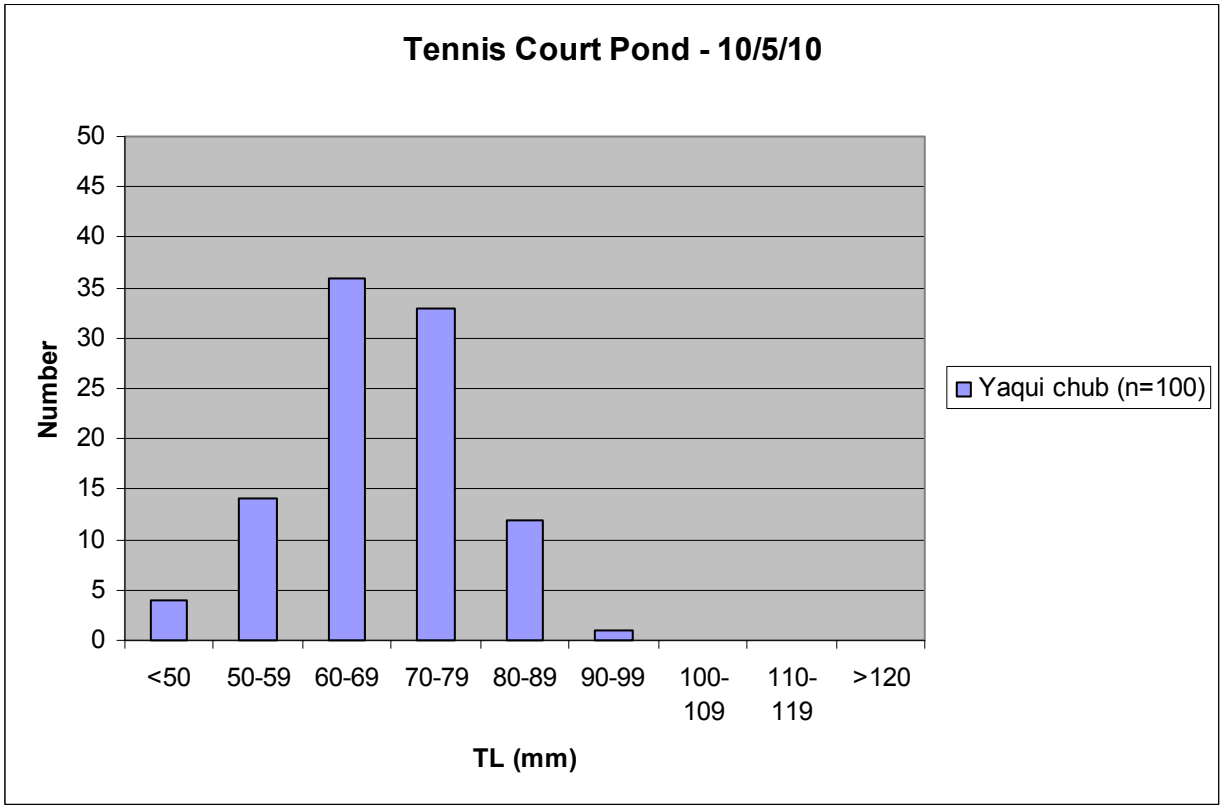

Figure 2. Length-frequency histogram of a sub-sample of Yaqui chub collected in Tennis Court Pond during El Coronado Ranch HCP monitoring in October 2010.

Discussion
Tennis Court Pond has high numbers of Yaqui chub when the pond consistently holds water (Table 1). However, the pond dried in 2006, and no fish were collected in 2006 or 2007. In October 2007 (following the fall monitoring effort), 68 Yaqui chub were

relocated from Lower Guesthouse Pond to re-establish the population in Tennis Court Pond. In November 2009, a total of 3,000 chub were salvaged from ECR ponds due to concern that drought may have had an impact on the populations (Voeltz 2010). Heavy precipitation occurred throughout 2010, and the ponds did not go dry.

Table 1. Numbers of fish collected between 2003 and 2010 from Tennis Court Pond.

Year	Yaqui chub
2003	799
2004	413
2005	363
2006	0
2007	0
2008	70
2009	1264
2010	1023

Lodge Pond

Methods

Eleven minnow traps were fished overnight (1630-hr to 0830-hr) on October 4-5, 2010 in the Lodge Pond. A sub-sample of 100 chub collected were measured and immediately released back into Lodge Pond. CPUE was calculated as the number of fish/total hours of netting.

Results

A total of 862 Yaqui chub were collected in approximately 16 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 4.90 fish/hour. Mean total length of the sub-sample of Yaqui chub measured was 67.6 mm and ranged in size from 39 to 85 mm (Figure 3).

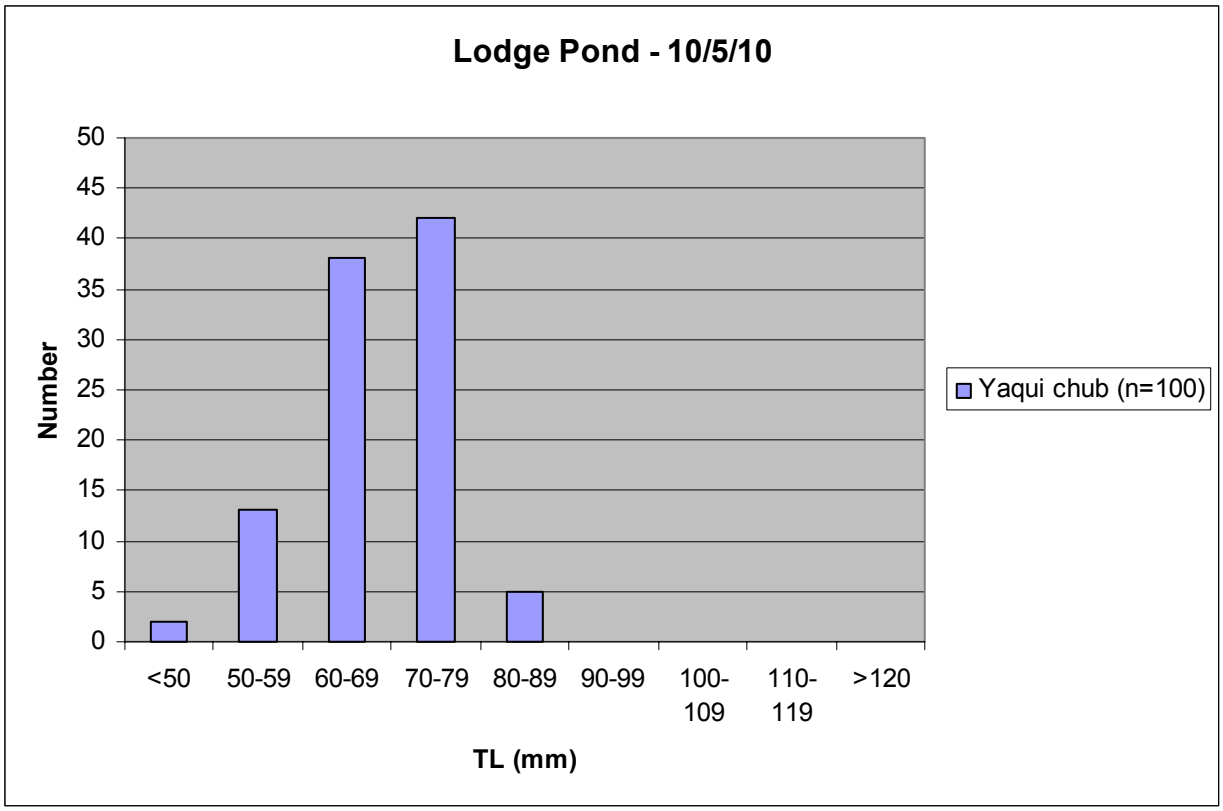

Figure 3. Length-frequency histogram of a sub-sample of Yaqui chub collected in Lodge Pond during El Coronado Ranch HCP monitoring in October 2010.

Discussion

Much like Tennis Court pond, Lodge Pond is capable of supporting a large population of Yaqui chub with consistent water levels. Lodge Pond may make an ideal site to stock Yaqui topminnow *Poeciliopsis occidentalis sonoriensis* either under the AGFD's Safe Harbor Agreement or though modification of the HCP.

Table 2. Numbers of fish collected between 2006 and 2010 from Lodge Pond.

Year	Longfin dace	Yaqui chub	Mexican stoneroller
2006	0	0	-
2007	0	4	0
2008	0	237	1
2009	0	1531	0
2010	0	862	0

Upper Guesthouse Pond

Methods

Twelve minnow traps were fished overnight (1700-hr to 900-hr) on October 4-5, 2010 in the Upper Guesthouse Pond. A sub-sample of Yaqui chub collected were measured and immediately released back into Upper Guesthouse Pond. CPUE was calculated as the number of fish/total hours of netting.

Results

A total of 1131 Yaqui chub were collected in approximately 16 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 5.89 fish/hour. Mean total length of the sub-sample of Yaqui chub measured was 69.2 mm and ranged in size from 32 to 110 mm. The majority (66%) of fish in the measured sub-sample were of the 60 to 79 mm modal length classes, which was expected based on the abundance of 50 to 59 mm modal length class in 2009 (Figure 4).

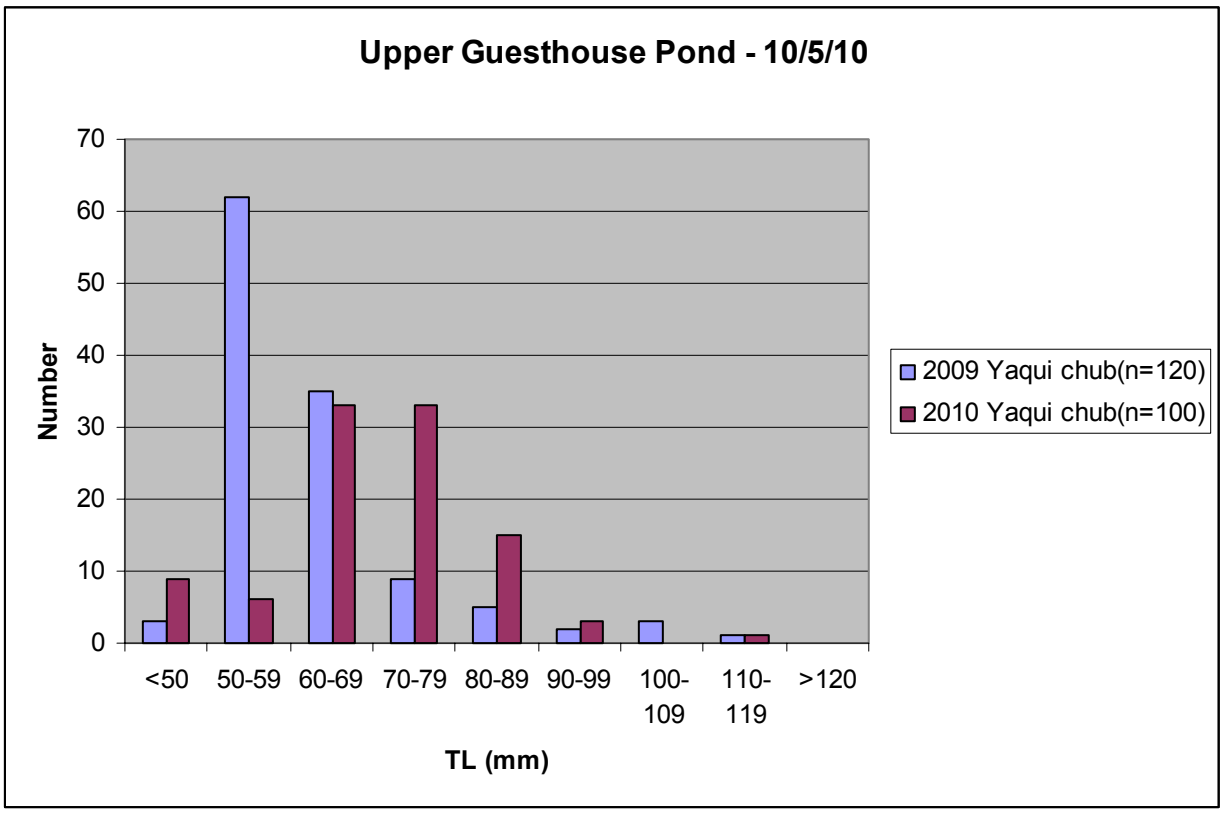

Figure 4. Length-frequency histogram of a sub-sample of Yaqui chub collected in Upper Guesthouse Pond during El Coronado Ranch HCP monitoring in October 2010.

Discussion

The population size of Yaqui chub in Upper Guesthouse Pond (Table 3) dropped between 2009 and 2010, likely because of low water levels at the end of 2009 and the salvage that occurred in November 2009. However, Figure 4 shows that the abundance of young (50 to 59 mm size class) have grown into adult chubs. If water levels remain stable, the 2011 chub population should be as large, if not larger, than the 2009 census.

Table 3. Numbers of fish collected between 2003 and 2010 from Upper Guesthouse Pond.

Year	Longfin dace	Yaqui chub
2003	0	1
2004	0	0
2005	11	240
2006	110	0
2007	0	0
2008	0	52
2009	6	2151
2010	0	1131

Lower Guesthouse Pond

Methods

Twelve minnow traps were fished overnight (1700-hr to 900-hr) on October 4-5, 2010 in the Lower Guesthouse Pond. A sub-sample of Yaqui chub collected were measured and immediately released back into Upper Guesthouse Pond. CPUE was calculated as the number of fish/total hours of netting.

Results

A total of 1684 Yaqui chub were collected in about 16 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 8.77 fish/hour. Mean total length of the sub-sample of Yaqui chub measured was 62.1 mm and ranged in size from 31 to 93 mm. About 43% of fish in the measured sub-sample were of the 60 to 69 mm modal length class, which shows the growth from the previous year when the majority of the fish were in the 50 to 59 mm modal length class (Figure 5).

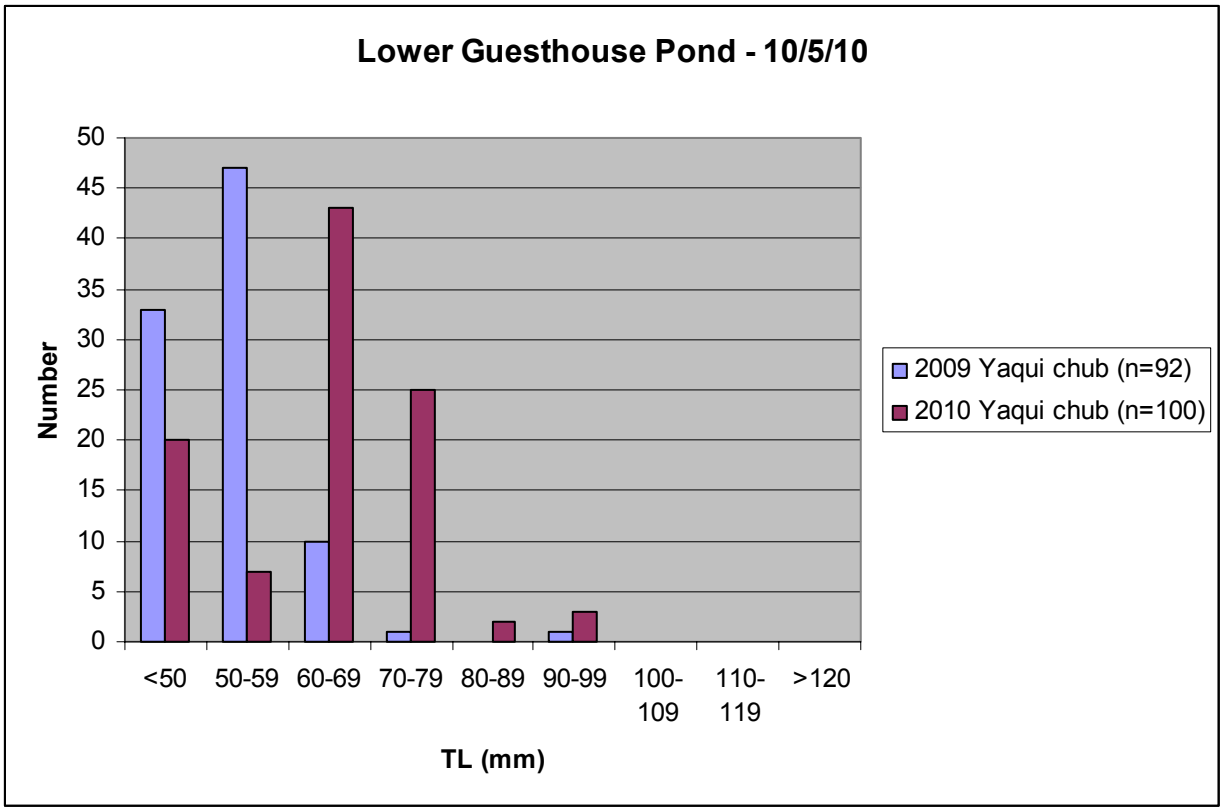

Figure 5. Length-frequency histogram of a sub-sample of Yaqui chub collected in Lower Guesthouse Pond during El Coronado Ranch HCP monitoring in October 2010.

Discussion

The surge in the population of Yaqui chub in Lower Guesthouse Pond is good news, as chub numbers had been slowly rebounding in Lower Guesthouse Pond since the 2006 drought (Table 4). Before 2007, Lower Guesthouse pond was sampled using seines; however, to make future data comparable between the ponds on the ranch, the decision was made in 2007 to sample with minnow traps.

Table 4. Numbers of fish collected between 2004 and 2010 from Lower Guesthouse Pond.

Year	Longfin dace	Yaqui chub
2004	0	0
2005	27	19
2006	11	0
2007	2	66
2008	35	132
2009	0	616
2010	0	1684

Ponds Summary

Following the severe drought conditions that dried, or nearly dried, all of the ponds on the ranch in 2006, the Yaqui chub populations have rebounded in all four regularly sampled ponds (Figure 6). This was a result of restocking Tennis Court and Lodge ponds in 2007, and natural dispersal to Upper and Lower Guesthouse ponds.

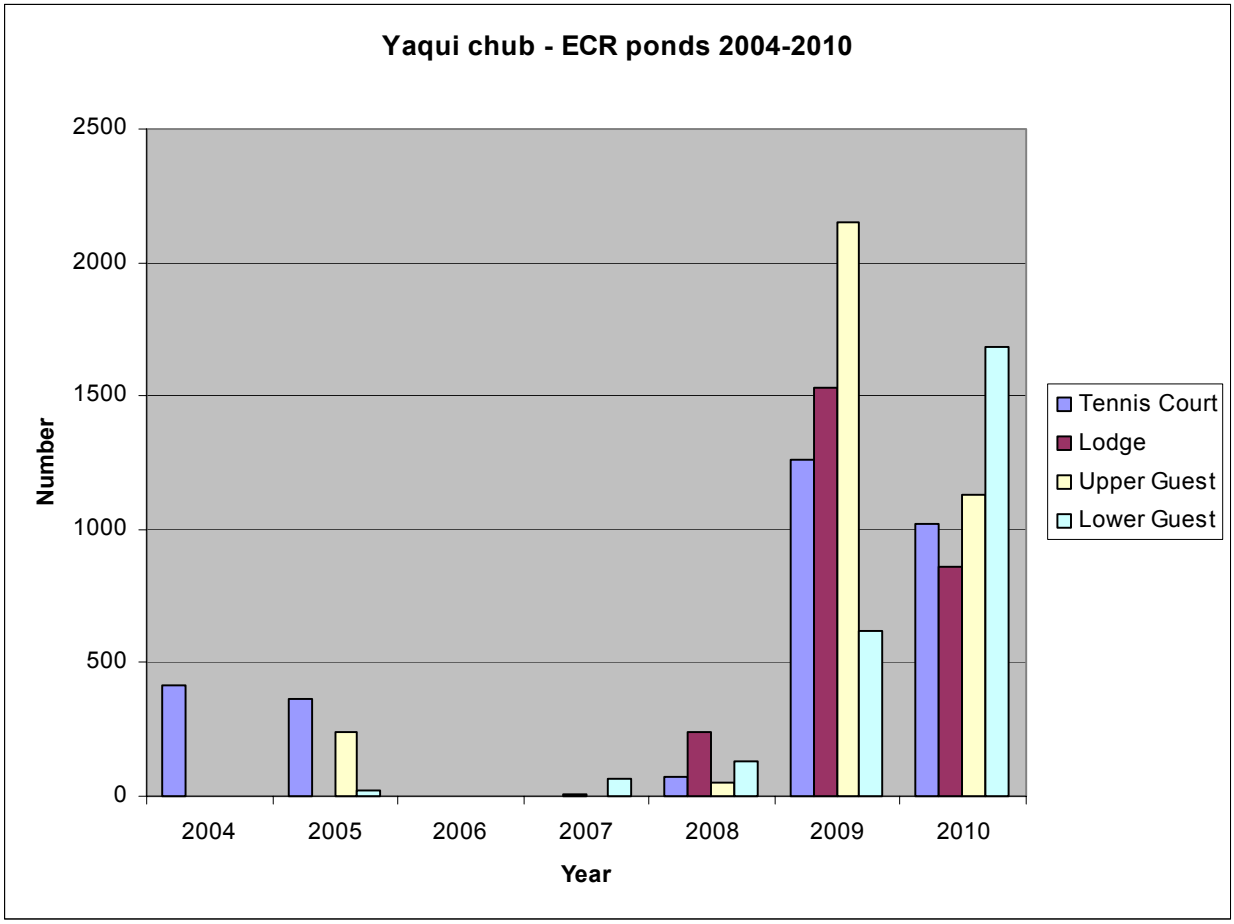

Figure 6. Total numbers of Yaqui chub collected from four ponds during El Coronado Ranch HCP monitoring in October 2004 - 2010.

WEST TURKEY CREEK SURVEY

Methods
A Smith-Root, Inc. Model LR-20 backpack electrofishing unit (settings: 150-200 volts, 30 Hz, output ~0.4 amps) was used to sample all three standard monitoring sites of West Turkey Creek on October 5, 2010 (Appendix B). Each standard site is 100-m long and was shocked from downstream to upstream, with actual shocking seconds recorded. All fish captured were identified to species, a sub-sample measured if species collections were over 50 (longfin dace *Agosia chrysogaster* and green sunfish *Lepomis cyanellus* were just counted), and native fish returned alive to West Turkey Creek (green sunfish were removed). CPUE was calculated as the number of fish/minute of shocking.

El Coronado Ranch Site 1

Results
A total of 11 longfin dace, 36 Mexican stoneroller *Campostoma ornatum*, and 76 Yaqui chub were collected during 797 seconds of effort at ECR-1. Longfin dace, Mexican stoneroller, and Yaqui chub CPUE at this site was 0.83 fish/min., 2.71 fish/min., and 5.72 fish/min., respectively. Mean total length of Mexican stoneroller measured (n=36) was 67.2 mm and ranged in size from 44 to 105 mm. Mean total length of Yaqui chub measured (n=48) was 75.3 mm and ranged in size from 30 to 129 mm (Figure 7).

Discussion
The capture of stoneroller and chub <50 mm is encouraging, as it means that reproduction is continuing to occur. In addition, the abundance of longfin dace and multiple age classes of Yaqui chub is a positive sign that the populations are recovering following the 2006 drought.

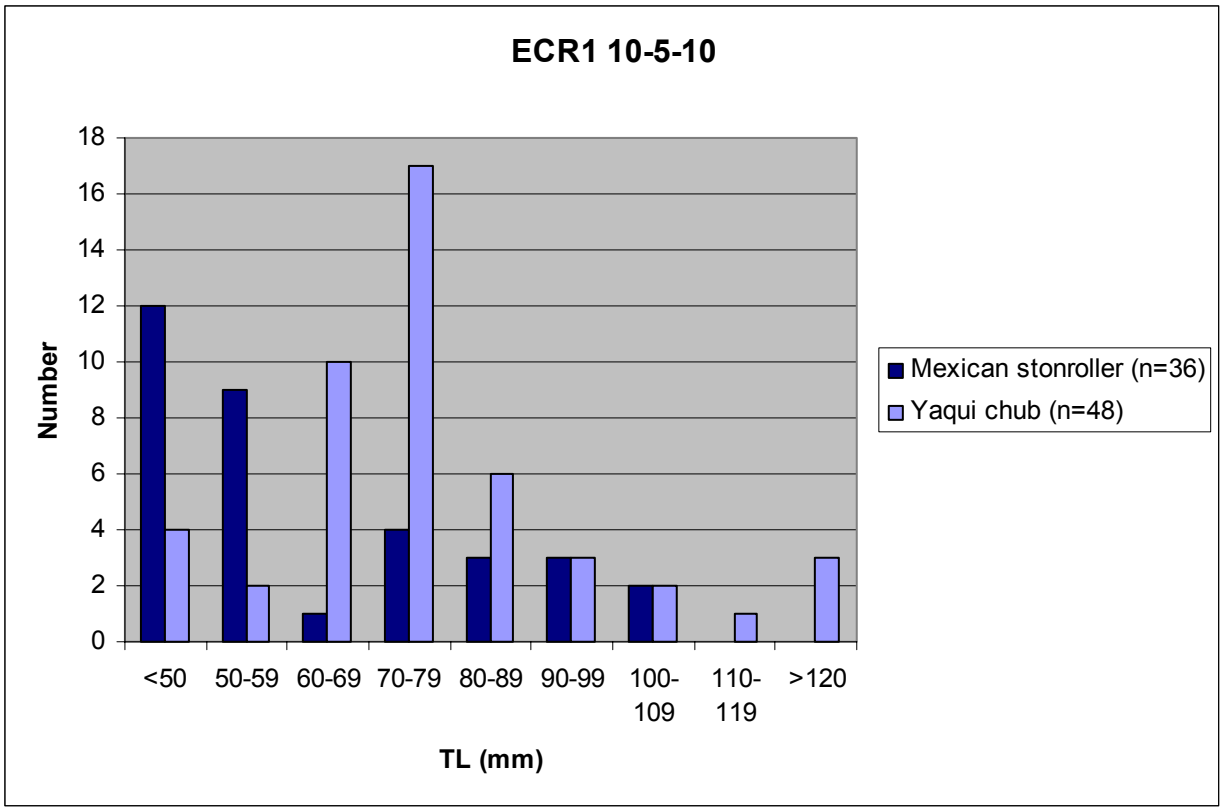

Figure 7. Length frequency histogram of Yaqui chub and Mexican stoneroller collected from ECR-1 during El Coronado Ranch HCP monitoring in October 2010.

Table 5. Numbers of fish collected between 2003 and 2010 from ECR-1.

Year	longfin dace	Mexican stoneroller	Yaqui chub
2003	0	-	19
2004	1	-	25
2005	12	-	32
2006	1	-	12
2007	55	7	25
2008	72	36	16
2009	67	30	23
2010	11	36	76

El Coronado Ranch Site 2

Results

A total of 50 longfin dace, 184 Mexican stoneroller, and 79 Yaqui chub were collected during 1069 seconds of effort at ECR-2. Longfin dace, Mexican stoneroller, and Yaqui chub CPUE at this site was 2.81 fish/min., 10.33 fish/min., and 4.43 fish/min., respectively. Mean total length of Mexican stoneroller measured (n=50) was 79.4 mm and ranged in size from 40 to 129 mm. Mean total length of Yaqui chub measured (n=50) was 69.6 mm and ranged in size from 45 to 114 mm (Figure 8).

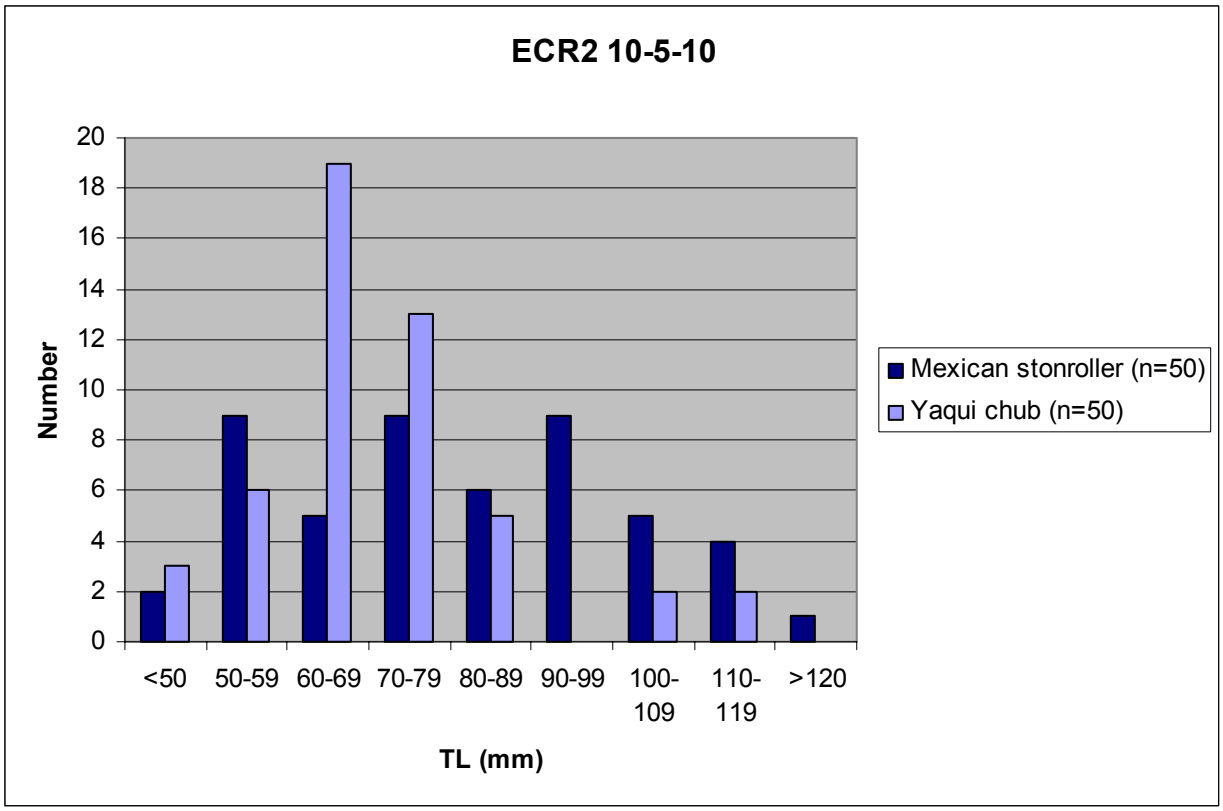

Figure 8. Length frequency histogram of Mexican stoneroller and Yaqui chub collected from ECR-2 during El Coronado Ranch HCP monitoring in October 2010.

Discussion

The increased abundance of stoneroller and chub this year compared to 2009 is yet another sign that West Turkey Creek is recovering from the severe 2006 drought.

Table 6. Numbers of fish collected between 2003 and 2010 from ECR-2.

Year	longfin dace	Mexican stoneroller	Yaqui chub
2003	2	-	0
2004	3	-	5
2005	45	-	0
2006	0	-	0
2007	32	1	0
2008	47	31	17
2009	37	19	0
2010	50	184	79

El Coronado Ranch Site 3

Results

A total of 568 longfin dace, 122 Mexican stoneroller, 2 Yaqui chub and 2 green sunfish were collected during 2039 seconds of effort at ECR-3. Longfin dace and Mexican stoneroller CPUE at this site was 16.71 fish/min. and 3.59 fish/min., respectively. Mean

total length of Mexican stoneroller measured (n=50) was 89.6 mm and ranged in size from 41 to 123 mm (Figure 9).

Discussion

Small numbers of green sunfish continue to be collected (and removed) in this reach; indicating the species is still present in the creek below the fish barrier. The abundance of both Mexican stoneroller and longfin dace this year is a good sign that the populations of native fish are recovering following the drought.

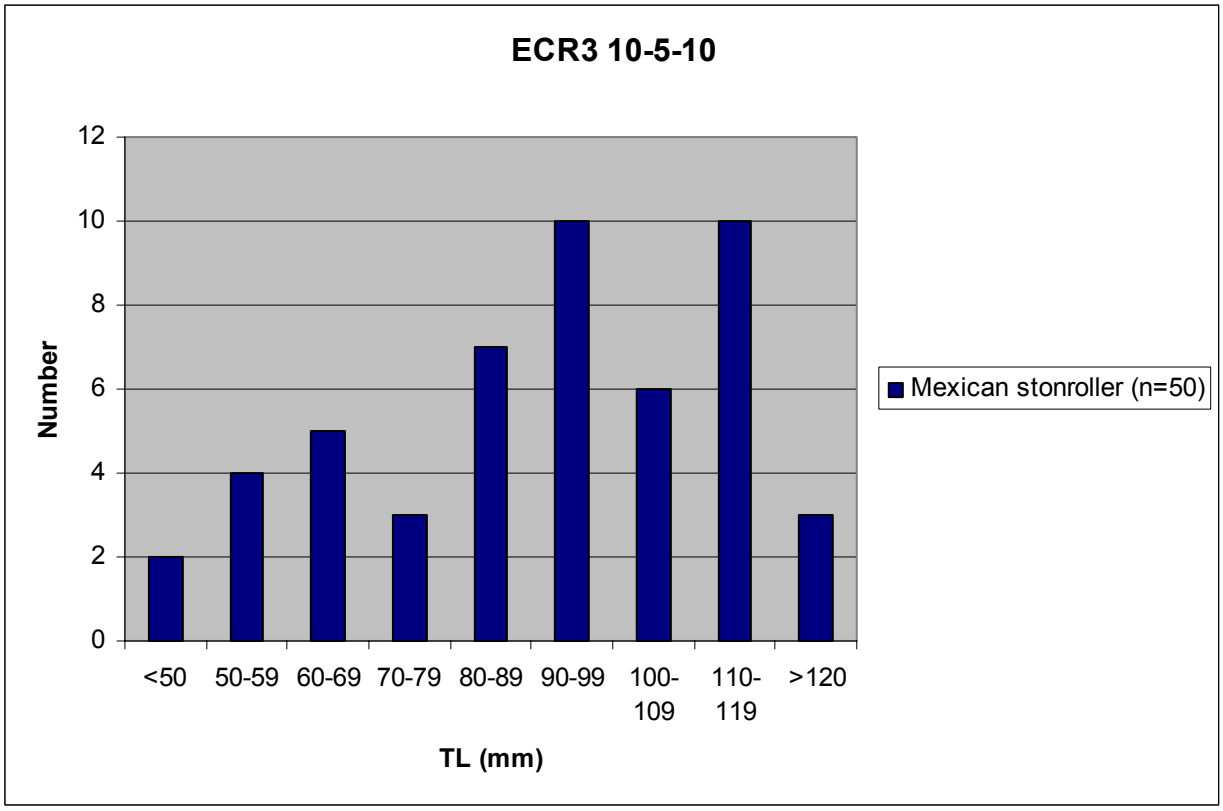

Figure 9. Length frequency histogram of Mexican stoneroller collected from ECR-3 during El Coronado Ranch HCP monitoring in October 2010.

Table 7. Numbers of fish collected between 2003 and 2010 from ECR-3.

Year	longfin dace	Mexican stoneroller	Yaqui chub	green sunfish
2003	134	-	0	1
2004	31	-	1	22
2005	321	-	0	18
2006	0	-	0	4
2007	78	0	1	8
2008	362	7	1	2
2009	326	14	0	3
2010	568	122	2	2

FUTURE MONITORING AND MANAGEMENT RECOMMENDATIONS

Monitoring

- Continue to record each type of sampling gear and more importantly the number of each species collected in that gear separately. This is needed so that a mean CPUE, variance, and confidence intervals can be generated for each gear type and species. Mean CPUEs and confidence intervals are needed to detect changes in population trends. CPUEs generated from "pooled" data (i.e., 10 traps catching 10 fish over a period of 10 hours equaling a CPUE of 10fish/100 hours) do not allow for means, variances, and confidence intervals to be calculated.

- Continue to measure and record total length of all native fishes collected (or a sub-sample if collection numbers are over 100) to allow for the development and interpretation of length-frequency histograms. Length-frequency histograms will also reduce biologist subjectivity with regards to categorizing fish as either juvenile or adult. Having multiple measuring boards and data books will allow for quicker processing as well.

- All Yaqui catfish captured should continue to be measured for total length, weighed, and scanned for the presence of a PIT tag. All "unmarked" catfish should have a PIT tag inserted and PIT tag number recorded.

- Continue implementing HACCP policy of disinfecting sampling gear used at one site before the use at another site in an effort to reduce inadvertent introductions of parasites or pathogens into uninfected waters. To date, Asian fish tapeworm has not been documented from any fish collected from West Turkey Creek or El Coronado Ranch.

- Decide the monitoring frequency for Big Tank. It was not monitored in October 2010 because of concerns that the monitoring did not have a clear goal.

Management

- If low water levels occur, pump Big Tank dry. Salvage all Yaqui catfish during the project, and eliminate all green sunfish and black crappie. Depending on numbers of Yaqui catfish, translocate some to pond(s) on the Bar Boot Ranch, or return them to Big Tank when it fills.

- Yaqui topminnow should be stocked into at least Lodge Pond under AGFD's Safe Harbor Agreement for topminnows and pupfish in Arizona (AGFD 2007), or through modification of the HCP.

- Discuss among all interested parties if downlisting of Yaqui chub should be proposed due to on-going threat reductions and recovery efforts at El Coronado Ranch, Bar-Boot Ranch, and the San Bernardino and Leslie Canyon National Wildlife Refuges.

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Appendix A. El Coronado Ranch HCP fish monitoring 2010 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2010 (Brouder 2005, 2006, Voeltz 2006, Johnson 2007, Voeltz 2009, 2010). Values presented are number of fish caught. Sampling methods: ES=backpack electroshocking.

Site	Year	Method	Total effort	longfin dace	Mexican stoneroller	Yaqui chub	green sunfish
ECR-1	2004	ES	1800 s	1	-	25	-
	2005	ES	390 s	12	-	32	-
	2006	ES	791 s	1	-	12	-
	2007	ES	759 s	55	7	25	-
	2008	ES	605 s	72	36	16	-
	2009	ES	242 s	67	30	23	-
	2010	ES	797 s	11	36	76	-
ECR-2	2004	ES	827 s	3	-	5	-
	2005	ES	-	45	-	-	-
	2006	ES	486 s	-	-	-	-
	2007	ES	510 s	32	1	-	-
	2008	ES	557 s	47	31	17	-
	2009	ES	163 s	37	19	-	-
	2010	ES	1069 s	50	184	79	-
ECR-3	2004	ES	928 s	31	-	1	22
	2005	ES	1405 s	45	-	5	13
	2006	ES	569 s	-	-	1	3
	2007	ES	673 s	78	-	1	8
	2008	ES	951 s	362	7	1	2
	2009	ES	415 s	326	14	-	3
	2010	ES	2039 s	568	122	2	2

Appendix A (continued). Sampling methods: MT=minnow trap; S=seining; HN=hoop net; DNS = did not sample.

Site	Year	Method	Total effort	longfin dace	Mexican stoneroller	Yaqui chub
Tennis Court Pond	2004	HN	32.0 h	-	-	-
		MT	96.0 h	-	-	413
	2005	MT	177.0 h	-	-	363
	2006	MT	216.0 h	-	-	-
	2007	MT	198.0 h	-	-	-
	2008	MT	210.0 h	-	-	70
	2009	MT	204.0 h	-	-	1264
	2010	MT	176.0 h	-	-	1023
Lodge Pond	2004	DNS	-	-	-	-
	2005	DNS	-	-	-	-
	2006	MT	100.2 h	-	-	-
	2007	MT	198.0 h	-	-	4
	2008	MT	216.0 h	-	1	237
	2009	MT	210.0 h	-	-	1531
	2010	MT	176.0 h	-	-	862
Upper Guest House Pond	2004	HN	42.0 h	-	-	-
		MT	84.0 h	-	-	-
	2005	S	702 m^2	11	-	240
	2006	S	600 m^2	110	-	-
	2007	MT	189.0 h	-	-	-
	2008	MT	216.0 h	-	-	52
	2009	MT	222.0 h	6	-	2151
	2010	MT	192.0 h	-	-	1131
Lower Guest House Pond	2004	HN	45.0 h	-	-	-
	2005	S	180 m^2	27	-	19
	2006	S	230 m^2	11	-	-
	2007	MT	173.3 h	2	-	66
	2008	MT	222.0 h	35	-	132
	2009	MT	222.0 h	-	-	616
	2010	MT	192.0 h	-	-	1684

Appendix B. Locations of monitoring sites on the El Coronado Ranch.

Tennis Court Pond. Located upstream of the Austin's office. Drive east along the road past the basketball court and tennis court. UTM (NAD83/WGS84) 3526947 N 654567 E

Lodge Pond. Located at the Austin's main building. UTM (NAD83/WGS84) 3527020 N 654387 E

Upper Guesthouse Pond. Located next to the guesthouses across the street from the El Coronado Ranch driveway. The upper pond is at the end of the circular driveway and has a stone dock. UTM (NAD83/WGS84) 3526867 N 653518 E

Lower Guesthouse Pond. Located immediately downstream of Upper Guesthouse Pond. UTM (NAD83/WGS84) 3526816 N 653405 E

Big Tank. Drive through the lower-most iron pipe gate on the north side of Turkey Creek road. Follow road to the tank. UTM (NAD83/WGS84) 3527188 N 651093 E

El Coronado Ranch Site 1. (ECR-1) Drive to the El Coronado Ranch guest houses. Follow the road through the turnaround by the last two houses, you will see the Upper Guesthouse pond. The road continues along the pasture fence where you will see the lower guesthouse pond. After the pasture, the road turns sharply to the left. Approximately 50m after the turn you will see another road on the right, turn right onto the orchard road. It will go down a hill, past an open field and a stock tank on the left. As you pass the western embankment of the stock tank the road will slope downward. Stop there. There will be a low point where a small outflow from the tank crosses the road. Follow the outflow NW until it meets West Turkey Creek. This is the upper point of the reach. Walk 100-m downstream and shock upstream. UTM (NAD83/WGS84) 3526655 N 652757 E.

El Coronado Ranch Site 2. [(ECR-2) – below Big Tank diversion] Begin below Big Tank infiltration intake (diversion). This site can be reached two different ways. First, is to drive down the orchard road past the ECR-1 site, and turning right before the road crosses the Cold Pit drainage. The road will cross West Turkey Creek just above the diversion. Second, drive down Turkey Creek road from the Austin's driveway to the first cattle guard. Go through a Texas gate (barbed wire gate) on the south side of the road before the cattle guard and follow the two-track road to the diversion site. UTM (NAD83/WGS84) 3526638 N 652468 E.

El Coronado Ranch Site 3. [(ECR-3) – Big Tank outflow barrier to lower boundary] Lowest barrier. Park at the very first cattle guard as you drive onto the El Coronado Ranch from Turkey Creek road, this is also the first cattle guard after Sander's house. There is a Texas gate (barb wire gate) on the north side of the road by the cattle guard. Go through the gate and walk down to the creek bottom. Follow the creek upstream

until you reach the barrier. Walk 100-m downstream and shock upstream. UTM (NAD83/WGS84) 3526932 N 651015 E

U.S. Forest Service Site 1. [(USFS-1) – Dispersed Campsite] This sample site is approximately 0.40 miles from the end of West Turkey Creek road, below the junction of Morse Canyon and West Turkey Creek. The area was a small campsite that is being restored by USFS. It has sediment barrier fencing and has been seeded. UTM (NAD83/WGS84) 3525431 N 658180 E.

U.S. Forest Service Site 2. [(USFS-2) – Upper Sycamore Campground] Sycamore Campground upper waterfall. Park in Sycamore Campground and walk east until you reach West Turkey Creek. Follow the creek upstream to the base of the uppermost waterfall continuing downstream. UTM (NAD83/WGS84) 3526021N 657749 E.

U.S. Forest Service Site 3. [(USFS-3) – Lower Sycamore Campground] Sycamore Campground lower waterfall. From Sycamore Campground, follow the creek downstream until you reach a rock face (river left) along the stream below campground. Show downstream from that point. UTM (NAD83/WGS84) 3526254 N 657399 E.